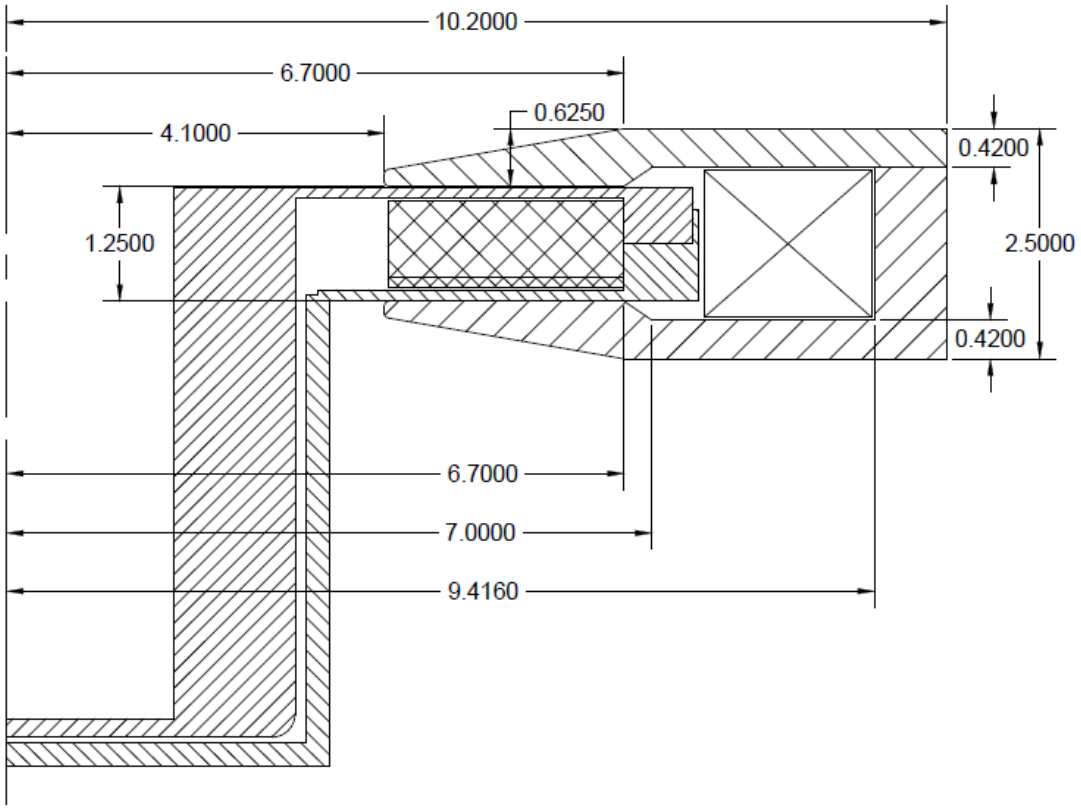
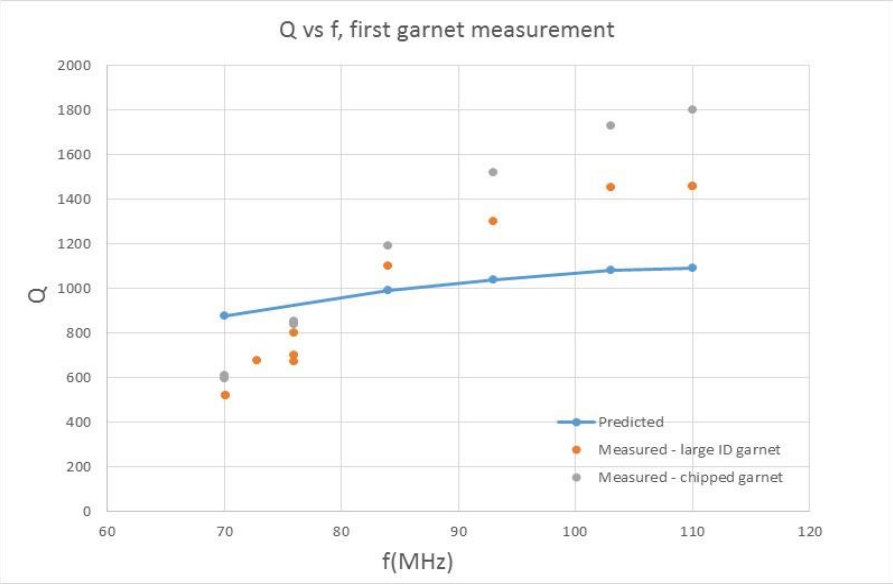
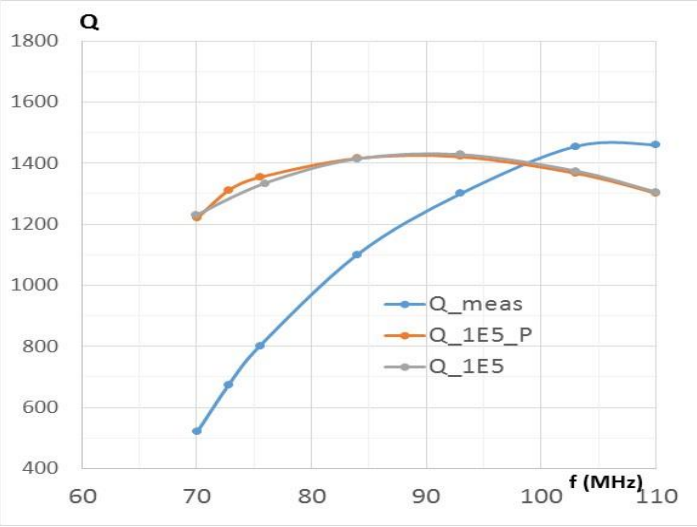
Ring Test Setup. Understanding First Measurement Results



Measurement results and associated questions





1. Prediction curve is generated assuming the measured empty cavity Q = 1400 and losses in the garnet corresponding to the loss factor $\alpha = 0.0033$.

2. At low frequency the measured Q seems too low; At higher frequency is seems too high.

3. Modeling is needed to get a clue for possible reasons of the trend

4. The difference between the two measurements cannot be explained just by the different geometries

2D model

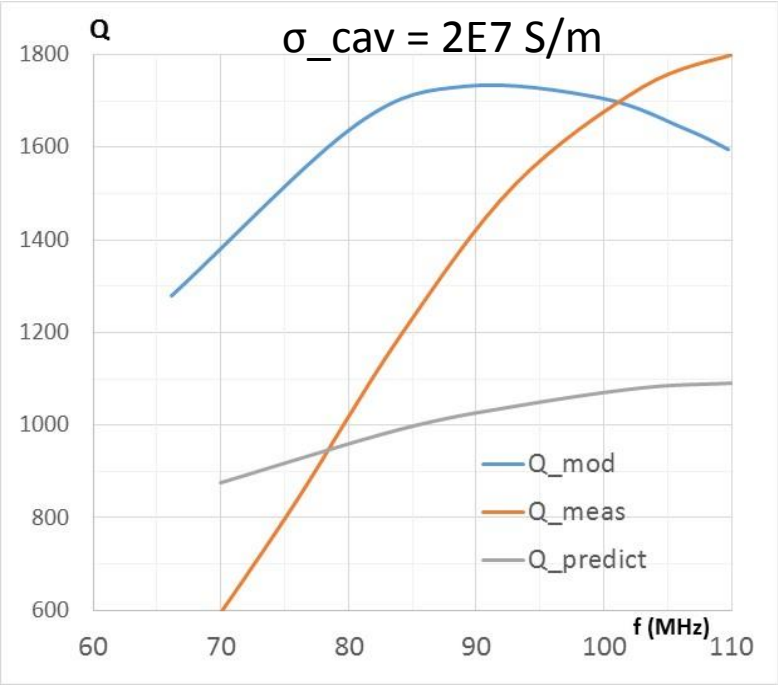
Empty cavity.

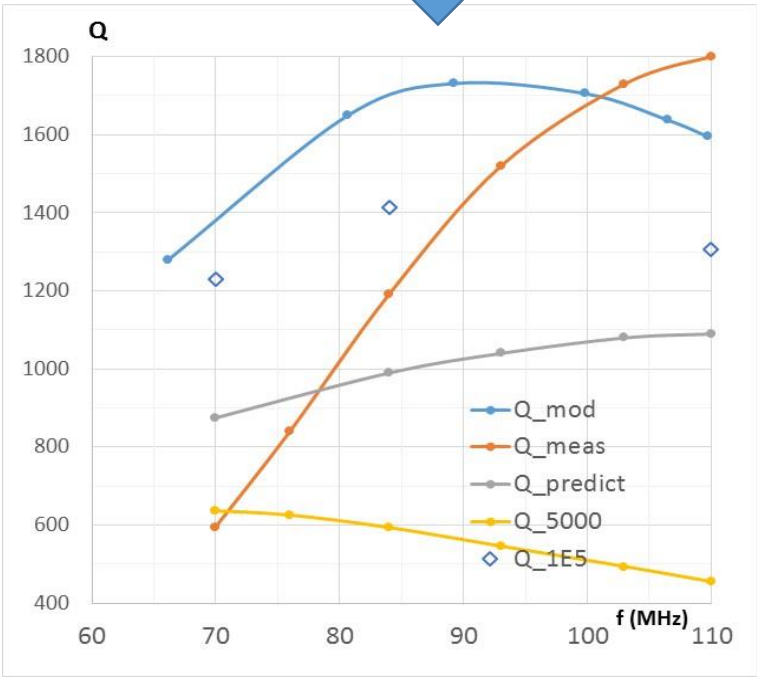
To explain the reduced quality factor (almost twice from the theoretical value, one must assume:

a) Higher resistivity of the material
b) Resistance in the existing contacts

Here the connection area conductivity was chosen first to match the measured Q at low frequency: 5000 S/m

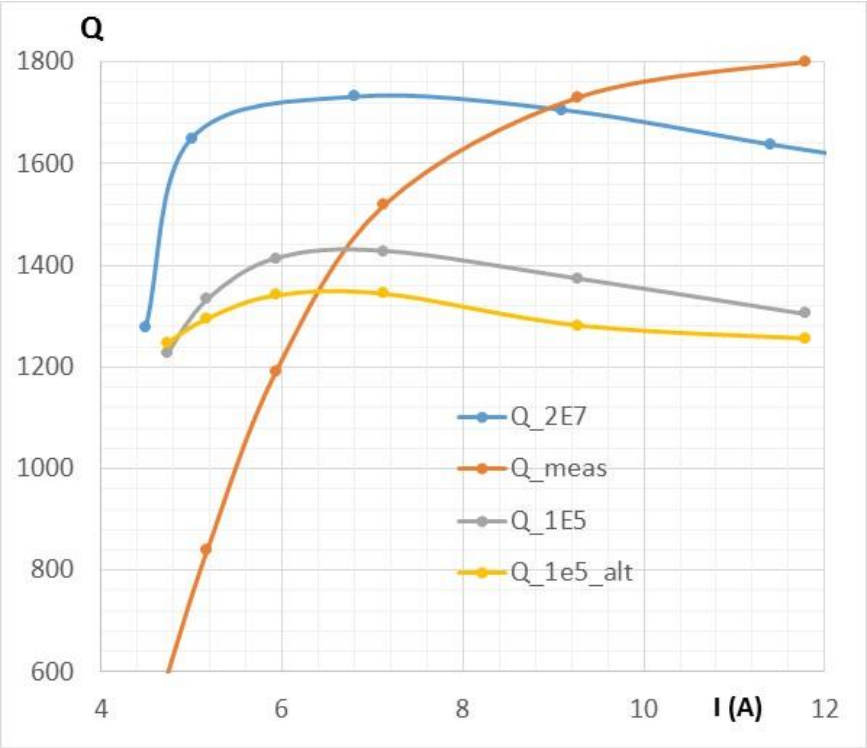
Modeling with the increase resistivity provides the following results:





Different ways to calculate Q

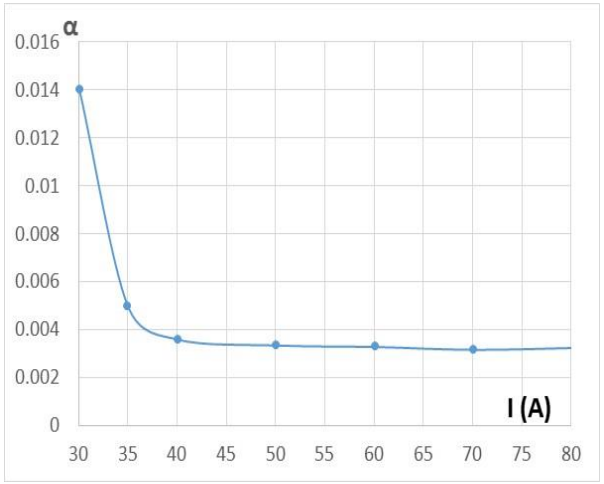
1. Using the “global” option that does it automatically
2. Analyzing energy stored and dissipated in the elements of the model.

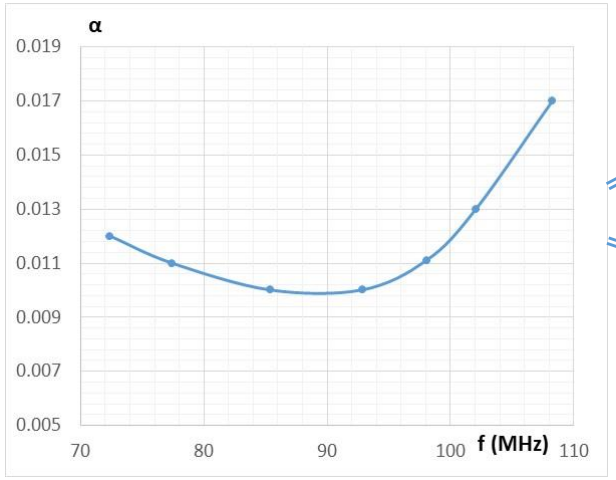


Results are almost identical

Trying to find a clue - 1

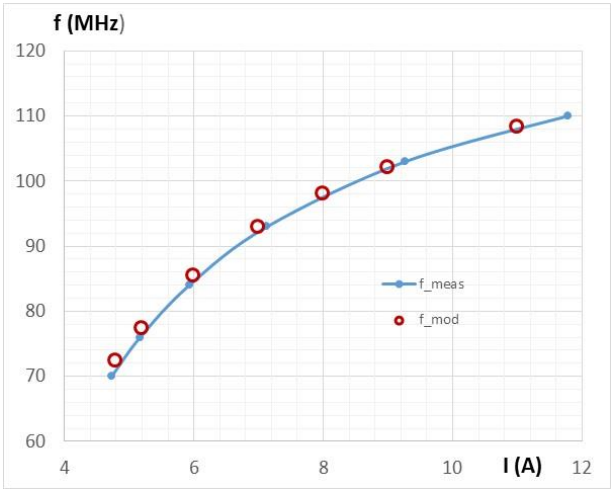
Loss coefficient extracted from the measurement data (TD-15-14)

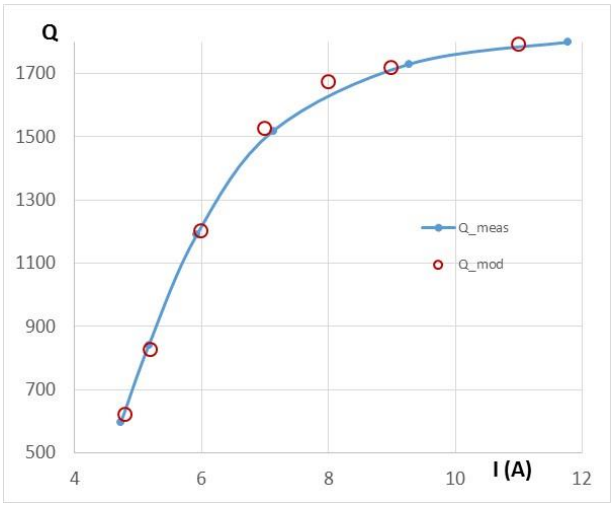




What loss factor would explain the results of the first measurements?

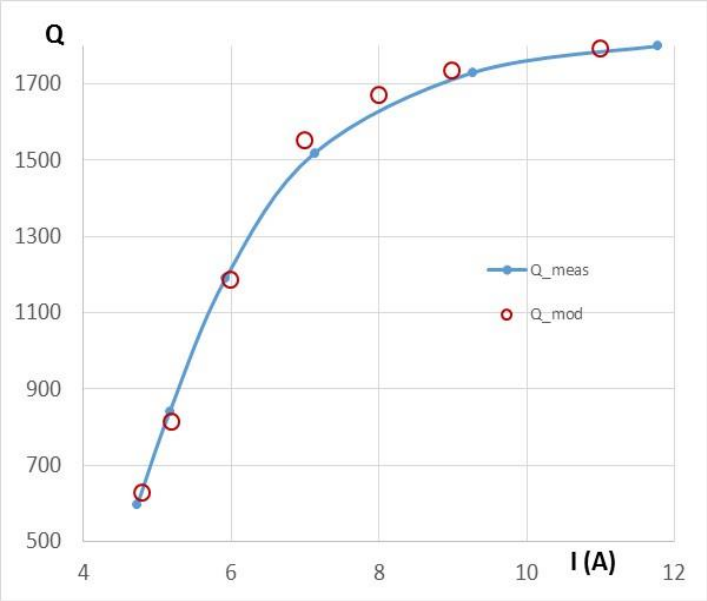
1. Pure copper cavity: σ = 6E7 S/m

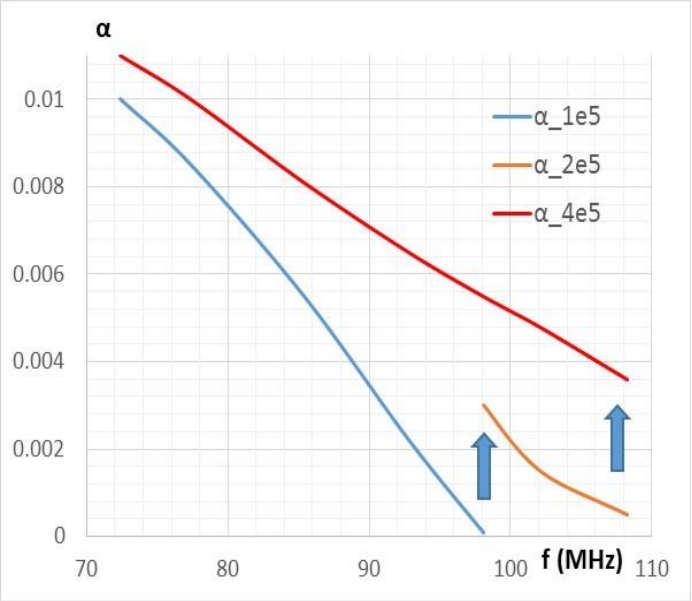




Trying to find a clue - 2

Fitting the loss coefficient for the case when wall conductivity is 6E7 S/m, but the connection area sigma is resistive





Increased contact resistivity does not fully explain the behavior of the system.
Need to check the case when all the cavity has higher wall resistivity.